इंटरनेट मानक

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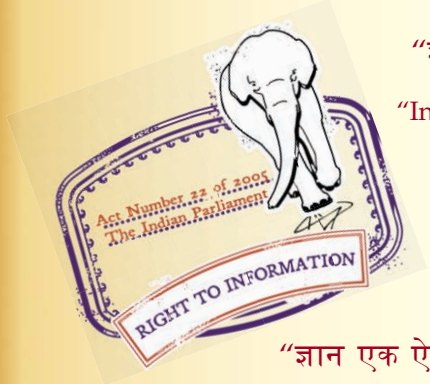
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 10605 (1989): Steel globe valves (flanged and butt welded ends) for petroleum, petrochemical and allied industries [MED 17: Chemical Engineering Plants and Related Equipment]



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Satyanarayan Gangaram Pitroda
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"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 10605 : 1989
(Reaffirmed 2005)

Indian Standard

STEEL GLOBE VALVES (FLANGED AND BUTT WELDED ENDS) FOR PETROLEUM, PETROCHEMICAL AND ALLIED INDUSTRIES—SPECIFICATION

(First Revision)

भारतीय मानक

पैट्रोलियम, पैट्रोरसायन और सम्बद्ध उद्योगों के लिए इस्पात के ग्लोब वाल्वों (फलेंजदार और टक्कर — वेल्डित सिरों वाले) — विशिष्टि

(पहला पुनरीक्षण)

UDC 621·646·2 : 669·14 : 665·6/·7

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

August 1990 Price Group 7

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 12 June 1989, after the draft finalized by the Industrial Valves Sectional Committee had been approved by the Heavy Mechanical Division Council.

This standard first published in 1983, has been revised to incorporate the figures of globe valves in closed and open position for better understanding. The values of nominal size below DN 50 and above DN 250 have been deleted from this standard since the smaller sizes have been included in IS 11733 : 1986 'Steel wedge globe and check valves for petroleum, petrochemical and allied industries (normal size 50 mm and smaller)' and higher sizes are rarely used.

In the preparation of this standard, assistance has been derived from the following overseas standards:

a) BS 1104 : 1957 General purpose ACME screw threads. British Standards Institution, UK

b) BS 11560 : 1970 Steel pipe flanges and flanged fittings (nominal size ½ m to 24 m) for the petroleum industry. British Standards Institution, UK

c) BS 1873 : 1975 Steel globe and globe stop and check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries. British Standards Institution, UK

d) ANSI B 1.5 : 1977 ACME screw threads. American National Standards Institute, USA

e) ANSI B 1.8 : 1977 Stub ACME screw threads. American National Standards Institute, USA

f) ANSI B 16.5 : 1981 Pipe flanges and flanged fittings, steel nickel alloy and other special alloys. American National Standards Institute, USA

g) MS S.SP-6-1980 Standard finishes for contact faces of pipe flanges and connecting end flanges of valves and fittings. Manufacturers' Standardization Society of the Valves and Fittings Industry, USA

Indian Standard

STEEL GLOBE VALVES (FLANGED AND BUTT WELDED ENDS) FOR PETROLEUM, PETROCHEMICAL AND ALLIED INDUSTRIES—SPECIFICATION

(First Revision)

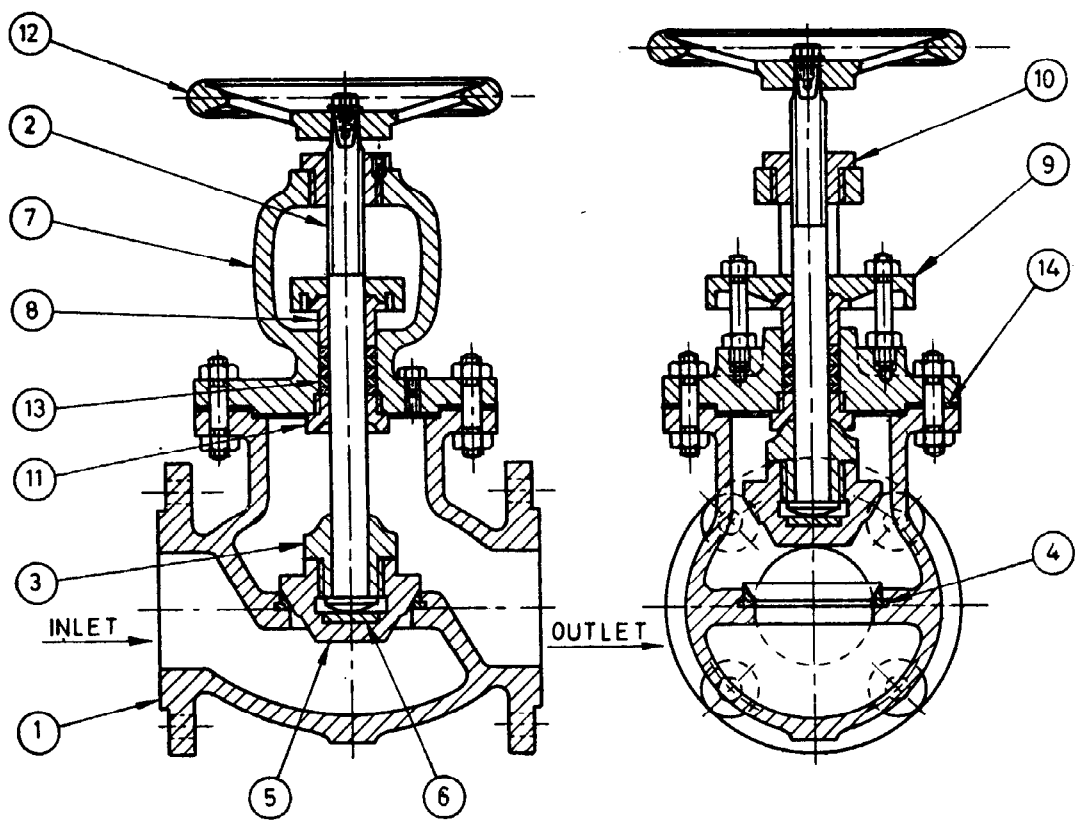
1 SCOPE

1.1 This standard specifies the requirements for cast or forged carbon and alloy steel globe valves with flanged or butt-welded ends.

1.2 This standard covers the valves in nominal sizes, from DN 50 to DN 250 corresponding to nominal sizes in IS 9520 : 1980 'Nominal size for valves' and classes 150 to 2 500.

1.3 The valves shall be of outside screw and yoke (OS and Y) with rising stem and hand-wheel and bolted bonnet type. Any special sealing arrangement may be given based on agreement between the purchaser and the manufacturer.

1.4 The standard nomenclature for valve parts is given in Fig. 1.



Part No.	Description	Part No.	Description
1	Valve body	8	Gland
2	Stem	9	Gland flange
3	Disc nut	10	Yoke bush/stem nut
4	Body face ring	11	Back seat bush
5	Disc	12	Hand wheel
6	Disc plate	13	Gland packing
7	Yoke bonnet	14	Gasket for body/bonnet

FIG. 1 GLOBE VALVE PLUG TYPE DISC

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 DESIGN

3.1 Pressure/Temperature Rating

The pressure/temperature ratings for valves covered by this standard shall be as specified in 'Indian Standard Specification for steel pipe flanges and flanged fittings (*under preparation*)' for respective body materials. Each pressure rating is the maximum allowable sustained non-shock pressure at the corresponding tabulated temperature.

NOTE — Till such time as the standard under preparation is published, the requirements shall be as agreed to between the purchaser and the supplier.

3.1.1 Pressure/temperature ratings may be interpolated between pressure/temperatures tabulated for intermediate service conditions. The pressure/temperature ratings for soft seated valves will be limited by the type of soft seat employed and will be as agreed to between the manufacturer and the purchaser.

3.1.2 The design metal temperature for determining the pressure rating shall be selected by the purchaser, subject to the requirements of the applicable code.

3.2 Valve Body and Bonnet

3.2.1 *Body*

The design of the body shall be such as will provide ample resistance to distortion under all reasonable conditions that may be encountered in service and avoid any undue strain or distortion of working parts and thereby impair the working of the valve.

3.2.1.1 The body shall be designed to offer least possible resistance to free flow of liquid through the valve. The end ports shall be circular in shape. The area of flow passages in the body shall everywhere be as nearly equal to the area of end ports as practicable.

3.2.2 *Wall Thickness of the Body and the Bonnet*

The minimum wall thickness of the body and the bonnet shall conform with the thickness as shown in Table 1.

Drilling of or pining to the valve is not permissible where this would reduce the effective thickness below minimum permitted value (for fixing plates, etc).

3.2.3 *Face to Face Dimensions*

The face-to-face dimensions for raised face flanged ends and end-to-end dimensions for butt-welded ends and ring joint flanged end valves shall conform to IS 9884 : 1981.

3.2.4 *End Flanges*

End flanges shall be cast or forged integral with the body except that the flanges may be attached by welding if so specified in the purchase order. End flanges attached by welding shall be butt welding type and welds including qualifications of welding procedure and welding operator shall be as specified in IS 2825 : 1969 or as specified in the purchase order.

3.2.5 *End Flanged Dimensions*

End flange dimensions shall be as specified in 'Indian Standards Specification for steel pipe flanges and flanged fittings (*under preparation*)', for the facing specified in the purchase order. The end flanges shall be provided with 1·6 mm raised face for Class 150 and Class 300 valves and 6·4 mm raised face for higher ratings. The end flanges shall be machine finished on the joint side and spot faced or back faced for the type of facings specified in the purchase order. Flanges as per other standard specification may be given subject to agreement between the manufacturer and the purchaser.

NOTE — Till such time the standard under preparation is published, the requirements shall be as agreed to between the purchaser and the supplier.

3.2.6 *Facing Finish*

Facing finish of raised face and flanges shall be either serrated concentric or serrated spiral having 24 to 40 grooves per 25 mm. The resultant surface finish shall have 3·2 to 12·5 μm Ra surface roughness number. Other finishes may be furnished by agreement between the purchaser and the supplier.

3.2.7 *Butt Welding Ends*

For butt welded end valves, the ends shall be circular and integral with the body. The butt weld ends shall conform to IS 11790 : 1986.

3.2.8 *Area Between Disc and Seat*

When in fully open position, the net area between the disc and the seat shall at least be equal to the area of the end port.

3.2.9 *By-Pass, Drain and Tap-D*

Drain and by-pass tappings shall be provided on valves if specifically mentioned in the purchase order. They shall be located and sized as specified in IS 9625 : 1980. The location shall be specified in the purchase order. If a tapping is made in the bonnet for testing the valve, then the same shall conform with the requirements specified above.

Table 1 Minimum Body and Bonnet Thickness and Minimum Stem Diameter in mm

(*Clauses* 3.2.2 *and* 6.5)

Nominal Valve Size	For Nominal Pressure Rating													
	Class 150		Class 300		Class 400		Class 600		Class 900		Class 1 500		Class 2 500	
DN	Shell mm	Stem Dia mm	Shell mm	Stem Dia mm	Shell mm	Stem Dia mm	Shell mm	Stem Dia mm	Shell mm	Stem Dia mm	Shell mm	Stem Dia mm	Shell mm	Stem Dia mm
50	8·7	19·0	9·5	19·0	—	—	11·1	22·0	—	—	19·0	28·6	22·0	38·1
80	10·3	25·4	11·9	25·4	—	—	12·7	28·6	19·0	31·8	23·8	35·0	30·2	44·4
100	11·1	28·6	12·7	28·6	12·7	31·8	15·9	31·8	21·4	35·0	28·6	38·1	35·7	50·8
150	11·9	31·8	15·9	35·0	16·7	38·1	19·0	41·3	25·4	44·4	38·1	50·8	48·4	63·5
200	12·7	35·0	17·4	38·1	19·0	41·3	25·4	44·4	31·8	50·8	47·6	57·2	61·9	76·2
250	13·5	38·1	19·0	41·3	21·4	47·6	28·6	50·8	36·5	57·2	57·2	66·7	67·5	68·9

3.2.10 *Seat Rings*

The body seat ring shall be of renewable type except as stated in **3.2.10.1**. The seat rings shall either be screwed in, rolled-in or welded and shall be either shoulder seated or bottom seated. The screwed portions of the shoulder seated rings shall not protrude below the lower face of the body dividing wall. Threaded rings shall be provided with lugs slots to facilitate removal and shall be suitably secured to prevent loosening in service. The assembly of seat rings may be carried out with a light lubricant but the use of sealing compound is prohibited. The seating surfaces of the seat ring shall be chamfered at the inner edge.

3.2.10.1 In case of austenitic steel valves and valves with hard faced seats, the seats may be integral or directly deposited on the valve body. In case of renewable seat rings with hard facing, the base material shall be the same as that of the body. The welded on deposit shall have a minimum thickness of 1·5 mm in the finished condition. The hard facing shall be a material equivalent to Stellite 6, Stellite 12, Stoody 6, etc, with a minimum hardness of 350 HB.

3.2.10.2 The hardness of the seating surface material shall be as specified in Table 2.

3.2.11 *Body/Bonnet Flanges*

The body/bonnet flanges shall be of circular form except that for valves of nominal size 50 DN, they may be square or rectangular. Flanges shall be spot faced or back faced.

3.2.12 *Body/Bonnet Joints*

The body/bonnet joint shall be of bolted type as specified. In all cases, the joint may be any of the following types:

a) Male and female type,
b) Tongue and groove type, and
c) Ring joint type.

Except for Class 150 which may be of plain/flat face type.

3.2.12.1 The body and bonnet joint shall have a minimum of four studs or stud bolts. The minimum size of the bolts shall be as given below:

Valve Size (Nominal) mm	*Bolt Size (Min)*
50	M 10
80 to 200	M 12
250	M 16

However, the design of the bolting shall be such that the total root cross-sectional area of the bolts shall be sufficient to produce a stress not exceeding 632 kgf/cm² (62 MPA) in the bolting material, by a pressure equal to the nominal pressure rating, acting on an area bounded by the effective outside periphery of the gasket (for a ring joint, use pitch circle diameter).

3.2.13 *Back Seat*

The bonnet shall be provided with a machined spherical or conical back seat, contacting a corresponding seating surface on the stem or disc assembly. Flat back seat may be provided subject to agreement between the purchaser and the manufacturer. Bonnet back seat shall be a bushing at the stem hole except for a valve with austenitic or hardfacing trim and for valves 50 DN, the seating surface may be an integral surface provided in the bonnet or weld deposited. The stem hole at the back seat shall be designed with proper clearance for guiding the stem and to prevent packing extrusion. Any welded on deposit on the back seat bushing or bonnet shall have a minimum thickness of 1·6 mm.

3.2.14 *Yoke*

The yoke shall be integral with or separate from the bonnet.

3.2.14.1 The yoke to stem nut bearing faces and yoke to bonnet joint faces (in case of separate yoke) shall be machined.

4 DISC, DISC NUT AND THRUST PLATE

4.1 The disc of the valve shall be either ball type, plug type or soft seated type and shall be specified in the purchase order. Flat type disc may be furnished with the valve subject to agreement between the purchaser and the manufacturer. The ball type disc shall be provided either with a radiused or spherical seating surface and the plug type disc with a conical seating surface.

4.2 The disc shall be threaded except for nominal sizes below 50 mm to receive the disc nut which retains the disc on the stem. The disc nut shall be securely fixed to the disc to prevent any possibility of loosening in service. When assembled, the disc shall be free on the stem to allow for proper seating and shall be renewable. The disc nut may be designed to provide a back seating surface to engage with back seat bushing in lieu of stem back seating as mentioned in **6.1**.

4.3 A separate thrust plate shall be provided in the disc to receive the stem. The minimum hardness of the thrust plate shall be 350 HB.

Table 2 Trim Materials

(*Clauses* 3.2.10.1, 10.1, 10.3.2, 10.4.2, 10.4.4, 10.5.1 *and* 10.6.1)

Trim	Material			Minimum Brinell Hardness			Acceptable Material Specification		
	Seat	Stem	Back Seat Bushing (*see* Note 2)	Seat Surface	Stem	Back Seat Bushing	Cast (*See* Note 1)	Forged	Bar
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cr 13	13 Cr	13 Cr	13 Cr	(*see* Note 3)	200	250	Gr 1 IS 7806 : 1985	12 Cr 13 IS 1570 (Part 5) : 1985	12 Cr 13 IS 6603 : 1972
18-8 Ti	18-8 Cr-Ni-Ti	18-8 Cr-Ni-Ti	18-8 Cr-Ni-Ti	Manufacturer's standard			Gr 5A IS 7806 : 1985	04Cr 18Ni 10Ti20 IS 1570 (Part 5) : 1985	04Cr18Ni10Ti20 IS 6603 : 1972
18-8 Nb	18-8 Cr-Ni-Nb	18-8 Cr-Ni-Nb	18-8 Cr-Ni-Nb	Manufacturer's standard			Gr 5A IS 7806 : 1985	04Cr18Ni10Nb40 IS 1570 (Part 5) : 1985	04Cr18Ni10Nb40 IS 6603 : 1972
18-10-2	18-10-2 Cr-Ni-Mo	18-10-2 Cr-Ni-Mo	18-10-2 Cr-Ni-Mo	Manufacturer's standard			Gr 5 IS 7806 : 1985	04Cr17Ni12Mo2 IS 1570 (Part 5) : 1985	04Cr17Ni12Mo2 IS 6603 : 1972
18-12-3	18-12-3 Cr-Ni-Mo	18-12-3 Cr-Ni-Mo	18-12-3 Cr-Ni-Mo	Manufacturer's standard			Gr 5 IS 7806 : 1985	04Cr17Ni12Mo2 IS 1570 (Part 5) : 1985	04Cr17Ni12Mo2 IS 6603 : 1972
25-20	25-20 Cr-Ni	25-20 Cr-Ni	25-20 Cr-Ni	Manufacturer's standard			Gr 9 IS 7806 : 1985	20Cr25Ni20 IS 1570 (Part 5) : 1985	20Cr25Ni20 IS 1570 (Part 5) : 1985
HF (Hard faced)	66-26-5 Co-Cr-W	—	—	350 (*see* Note 4)	—	—	—	—	—
	—	13 Cr	13 Cr	—	200	250	Gr 1 IS 7806 : 1985	12 Cr 13 IS 1570 (Part 5) : 1985	12 Cr 13 IS 6603 : 1972
CR 13 and Cu-Ni	13 Cr	13 Cr	15 Cr	250 (*see* Note 5)	200	250	Gr 1 IS 7806 : 1985	12 Cr 13 IS 1570 (Part 5) : 1985	12 Cr 13 IS 6603 : 1972
	Cu-Ni	—	—	175 (*see* Note 5)	—	—	Manufacturer's standard with 30 percent nickel, *Min*		
CR 13 and HF	13 Cr	13 Cr	13 Cr	300 (*see* Note 5)	200	250	Gr 1 IS 7806 : 1985	12 Cr 13 IS 1570 (Part 5) : 1985	12 Cr 13 IS 6603 : 1972
	66-26-5 Co-Cr-W	—	—	350 (*see* Note 5)	—	—	—	—	—
Ni-Cu	Ni-Cu alloy	Ni-Cu alloy	Ni-Cu alloy	Manufacturer's standard			NiCu29Mn18i3Fe IS 4131 : 1967	—	—
18-8	18-8 Cr-Ni	18-8 Cr-Ni	18-8 Cr-Ni	Manufacturer's standard			Gr 3 IS 7806 : 1985	04Cr18Ni10 IS 1570 (Part 5) : 1985	04Cr18Ni10 IS 6603 : 1972

NOTES TO TABLE 2

1 Castings not applicable to stem material.

2 For austenitic trims, the back seat may alternatively be a weld deposit of the same nominal material composition as the trim or welded on hardfacing. For hardface (HF) trim, the back seat may alternatively be welded on hardfacing.

3 Body and disc seating surface, 250 HB, *Min* with a minimum differential hardness of 50 HB between disc and body seat surfaces.

4 Differential hardness between disc and body seat surfaces is not mandatory.

5 Differential hardness between disc and body seat surfaces shall be manufacturer's standard.

4.4 In case of plug type disc, provision may be made for proper guiding of the disc.

4.5 Disc may be supplied with overlay of the deposited metal subject to agreement between the purchaser and the manufacturer. The thickness of the overlay shall be not less than 1·5 mm. In case of hardfacing overlay only, the minimum hardness shall be 350 HB.

5 HANDWHEEL AND HANDWHEEL NUT

5.1 The handwheel for a direct handwheel operated valve shall be spoke and rim design having not more than six spokes. Where the space between the spokes is limited, the provision of knobs or studs projecting beyond the outside diameter of the handwheel is allowed.

5.2 Unless the wheel size makes it impracticable, the handwheel shall have on it the word 'open' and an arrow pointing in the direction to open a valve.

5.3 The handwheel shall be fixed to the stem by a threaded handwheel nut.

5.4 The valve shall be opened by turning the handwheel in anticlockwise direction.

6 STEM AND STEM NUT

6.1 The stem shall be of one piece design and shall be of sufficient length. Stem shall have an integral end of button form. The underside of the button shall be radiused. Alternatively, the stem shall be provided with an integral collar to engage the disc nut in which case, the lower end of the stem shall be radiused.

6.2 The stem shall have an integral conical or spherical seating surface which will seat against the bonnet back seat bushing in fully open position. Alternatively, the disc nut may be designed to provide a seating surface to engage with back seat bushing.

6.3 All contact surfaces between the stem nut and the yoke shall be machine finished and stem nut properly secured to prevent loosening in service.

6.4 The threads of the stem and stem nut shall be of trapeozoidal type in accordance with IS 7008. Alternatively, the threads may also be of acme type or stub-acme type.

6.5 The size of the stem for each size and class of valve shall be as specified in Table 1.

6.6 The stem shall be ground finished to prevent damage to packing during operation.

7 STUFFING BOX PACKING AND LANTERN

7.1 The design of stuffing box shall be of sufficient strength such as to prevent any deformation or distortion during service.

7.2 The stuffing box diameter and packing width shall be as specified in Table 3.

7.3 The minimum depth of stuffing box shall be:

a) For Class 150 valves, equivalent to 6 rings of packing; and

b) For Class 300 valves and above, equivalent to lantern ring plus 5 rings of packing above and 2 rings of packing below the lantern.

7.4 The stuffing box flange shall be provided with two holes and not slots for two gland bolting.

Table 3 Stem Diameter Stuffing Box Bore and Packing Width

(*Clause* 7.2)

Nominal Stem Diameter	Stuffing Box Bore	Packing Width
mm	mm	mm
19·0	32·5	6·4
22·2	35·7	6·4
25·4	38·9	6·4
28·6	45·2	7·9
31·8	48·4	7·9
34·9	51·6	7·9
38·1	57·9	9·5
41·3	61·1	9·5
44·4	64·3	9·5
47·6	67·5	9·5
50·8	73·8	11·1
54·0	77·0	11·1
57·2	83·3	12·7
60·3	86·5	12·7
63·5	89·7	12·7
66·7	92·9	12·7
69·8	96·0	12·7
73·0	102·4	14·3
76·2	105·6	14·3
79·4	108·7	14·3
82·6	121·4	19·0
88·9	127·8	19·0
95·2	134·1	19·0

7.5 The inside of the stuffing box shall be reamed or machined smooth to prevent any damage to packing during compression.

7.6 The packings shall be square or rectangular in cross-section. The stuffing box shall be filled with packing completely prior to compression by gland. Moulded packings in lieu of braided packing may also be used.

7.7 A lantern shall not be furnished in a Cl-150 valve. In a valve of Cl-300 to Cl-2 500 nominal rating, a lantern shall be furnished only if specified in the purchase order. A lantern shall have two holes spaced 180° on each end, for its removal. These holes shall be either through hole for use of hook, or tapped. If lantern is furnished, the stuffing box shall be tapped opposite the centre of the installed lantern and fitted with a threaded round plug not less than R 1/4 IS 554; with loss as specified herein for a test tap in the bonnet if required for thread engagement.

8 BOLTING

8.1 The body and bonnet flange bolting shall be continuously threaded or stud bolts with two heavy semifinished nuts, conforming to IS 1364 (Part 5) : 1985 for bolting up to M39 and IS 3138 : 1966 for bolting between M42 and M150. For separate yokes, the botling shall be continuously threaded stud bolts or hexagonal headed bolts.

8.2 Bolting 25 mm or smaller shall have coarse threads (UNC or Metric). Bolting larger than 25 mm shall be as specified in IS 1364 (Part 1) : 1983.

8.3 The number and size of bolting shall be determined as specified in **3.2.12.1**.

8.4 The bolting shall be supplied in parkarized, phosphatized or in any other rust-proofed surface condition.

8.5 The gland shall be of two-piece self aligning design consisting of a gland flange and gland follower.

8.6 The gland follower shall have a shoulder at its outer end to prevent complete entry of the gland follower into stuffing box.

8.7 The gland flange shall be provided with two holes and not slots for two gland bolts.

8.8 The gland bolting shall be either:

a) Hinged eye bolt, or

b) Studs with hexagon nuts.

8.9 Threading of the gland bolting shall conform to **8.2**, but any stud for gland bolting shall be fitted into stuffing box with Class 5 interference fit as specified in IS 4218.

9 OPERATION

9.1 Unless otherwise specified in the purchase order, the valve shall be direct hand-wheel operated.

9.2 If chainwheel operation is required, the type of the chainwheel shall be as specified in the purchase order and any required chain shall also be as specified.

9.3 If gear operation is required, the type of gears and their arrangements shall be as specified in the purchase order.

9.4 If power operation is required, the type of power and power unit and the design maximum pressure differential across the valve shall be as specified in the purchase order.

9.5 Soft Seal Rings

9.5.1 Soft seal rings may be fitted either in the body seat or in the disc as specified by the purchaser. The ring shall be designed to compress down to the level of the metal seat when the disc is in fully closed position and to give a tight metal-to-metal seal even if the soft seal is damaged or removed.

9.5.2 The seal rings shall be designed to withstand a minimum of 2 000 cycles of operation in dry atmospheric conditions and there shall be no evidence of damage or cold flow, as revealed by spreading over the metal seat. The valves shall then meet the hydrostatic and air tests specified in IS 6157 : 1981.

10 MATERIAL

10.1 Trim comprises of:

a) Stem;

b) Body seat ring;

c) Disc, disc and thrust plate; and

d) Back seat bushing.

Trim material shall preferably be selected from the list in Table 2, and specified in the order.

10.2 Body and Bonnet

The material of the body and bonnet shall be specified in the purchase order.

10.2.1 The material of the body and bonnet depending on the service conditions, shall as far as possible be selected from the list of materials specified in Table 4.

10.2.2 Any material other than those specified in Table 4, if required, shall be stated in the purchase order and may be supplied subject to agreement between the purchaser and the manufacturer. The materials shall conform to the relevant specifications in all respects.

Table 4 Body and Bonnet Material

(*Clauses* 10.2.1 *and* 10.2.2)

	Material Type	Steel Designation	Reference to IS
	Carbon steel	Gr 2	2856 : 1987
C	Carbon steel (low temperature)	25 C 8	1570 (Part 2) : 1979
A	½ Mo steel (low temperature)	Gr 4	4899 : 1976
S	1 Cr ½ Mo steel	Gr 4	3038 : 1983
T	2¼ Cr 1 Mo steel	Gr 5	3038 : 1983
I	5 Cr ½ Mo steel	Gr 6	3038 : 1983
N	18 Cr-8 Ni	Gr 6	7806 : 1985
G	18 Cr-10 Ni 2 Mo	Gr 9	7806 : 1985
S	18 Cr-8 Ni-N 6	Gr 7	7806 : 1985
	Carpenter alloy	Gr 15	3444 : 1987
	3½ Ni steel	Gr 3	4899 : 1976
	Carbon steel	Gr 3	2004 : 1978
F	Carbon steel (low temperature)	15 C 8	1570 (Part 2) : 1979
O	1 Cr½ Mo steel	15 Cr 70 Mo 55	2611 : 1964
R	2¼ Cr 1 Mo steel	10 Cr 2 Mo 1	1570 (Part 5) : 1985
G	5 Cr½ Mo steel	20 Cr 5 Mo 55	1570 (Part 5) : 1985
I	3½ percent Ni steel	15 Ni 14 Cr 3 Mo 2	1570 (Part 5) : 1985
N	18 Cr-8 Ni	04 Cr 19 Ni 9	1570 (Part 5) : 1985
G	18 Cr-8 Ni-2 Mo	05 Cr 19 Ni 11 Mo 2	1570 (Part 5) : 1985
S	18 Cr-8 Ni-Nb	04 Cr 19 Ni 9 Nb 40	1570 (Part 5) : 1985
	18 Cr-8 Ni-Ti	04 Cr 19 Ni 9 Ti 20	1570 (Part 5) : 1985

NOTES

1 Material used shall be subjected to heat treatment procedure required by the corresponding material specification.

2 A comparative study of the ASTM and BS standards equivalent to the Indian standards and the grades are given in Annex B for information.

10.2.3 Yoke

Yoke separate from the bonnet shall be of carbon steel or of the same material as the shell.

10.3 Body Seat Rings

10.3.1 The material of the body seat rings shall be stated in the purchase order.

10.3.2 The material of the seat rings shall, as far as practicable, be selected from the list of materials specified in Table 2.

10.3.3 In case of seat ring with hard facings, the base material shall be a material at least equal to that compatible to the body material.

10.3.4 The hardness of the seat rings in case of 13 percent chromium material shall be 250 HB minimum. In case of integral or weld deposited seat rings, the hardness shall conform to the relevant specifications.

10.4 Disc, Disc Nut and Thrust Plate

10.4.1 The material of the disc shall be as specified in the purchase order.

10.4.2 The disc material shall, as far as practicable, be selected from the list of materials specified in Table 2.

10.4.3 In case of disc with overlay, the base material shall be at least equal to that of the body material.

10.4.4 The material of the disc nut shall either be the same as that of the disc or as specified in Table 2.

10.4.5 The disc thrust plate shall be of carbon steel or alloy steel with 350 HB minimum hardness. For valves with 13 percent chromium stem material, there shall be a hardness differential of 50 HB minimum between the stem and the disc thrust plate.

10.4.6 *Soft Seals*

Soft seals shall be of the manufacturer's standard material for the duties specified. Any retaining ring in the disc shall be of the same material as the stem but any fixing screws shall be of 18·8 chromium-nickel steel.

10.5 Stem and Stem Nut

10.5.1 The material of the stem shall be specified in the purchase order and shall preferably be as specified in Table 2.

10.5.2 The minimum hardness of the stem material shall be 200 HB in case of 13 percent chromium material. For austenitic steel and other materials, the hardness shall conform to the relevant specifications.

10.5.3 Stem nut shall be of non-rusting metal having a suitable bearing quality and a minimum melting point above 955°C.

10.6 Back Seat/Bonnet Bushing

10.6.1 The material of the back seat bushing shall be 13 percent chromium steel or as specified in Table 2.

10.6.2 The minimum hardness of the back seat bushing shall be 250 HB in case of 13 percent chromium material so as to maintain a minimum differential hardness of 50 HB between stem and back seat bushing and/or disc nut and back seat bushing as applicable.

10.6.3 For integral or weld deposited back seating surface, the hardness shall conform to the relevant material specifications.

10.7 Handwheel and Nut

10.7.1 The material for the handwheel shall be any of the following:

a) Steel, cast or forged,

b) Malleable iron conforming to Grade A as specified in IS 2108 : 1977 with a maximum phosphorus content of 0·12 percent.

10.7.2 Grey cast iron handwheel are not acceptable.

10.7.3 Handwheel on chainwheel nut shall be of austenitic steel, malleable iron modular iron or carbon steel. Any other material shall be subject to agreement between the purchaser and the manufacturer.

10.8 Packing

10.8.1 The packing supplied with the valve shall be suitable for the pressure/temperature of the valve.

10.8.2 Unless otherwise stated in the purchase order, the packing shall be suitable for steam or petroleum service containing a suitable corrosion inhibitor.

10.9 Bolting

The body/bonnet joint bolting shall conform to Gr 40 Cr 4 Mo 3 studs with Gr 45C 8 or 55 C 8 nuts of IS 1570 (Part 5) or equivalent. If any other bolting material is required, the same shall be specified in the purchase order.

10.10 Gland

10.10.1 The material of the gland follower shall be 13 percent chromium or 18-8 stainless steel. For other material, it shall be as per the agreement with the purchaser.

10.10.2 The material of the gland flange shall be steel, cast, rolled or forged. Carbon steel shall be supplied in rust proof condition.

10.11 Gasket

10.11.1 The body bonnet joint gasket may be any one of the following:

a) Spiral wound stainless steel with asbestos filler,

b) Soft iron, and

c) Single or double jacketed asbestos.

10.11.2 The material of the gasket shall be suitable for the service conditions and for the pressure/temperature rating of the valve.

10.11.3 For Class 150 valves, compressed asbestos fibre jointing may be used.

NOTE — Free chlorides in asbestos fibre material when used with low alloy or austenitic stainless steel may cause stress corrosion cracking. Hence, suitability of alternate gasket material should be looked into while ordering.

10.12 Lantern

Lantern, if furnished, shall be of material at least equal to that of the shell.

10.13 Name Plate

The name plate shall be of a corrosion resistant material attached to the valve by pins of similar material or by welding. For valves DN 150 and above, the material shall be 18-8 Cr Ni steel or equivalent.

11 VALVE COMPONENTS

11.1 Valve components shall be designed and manufacturing tolerances set to allow interchangeability of parts between units of same size, class and type from any one manufacturer.

12 INSPECTION AND TESTS

12.1 If inspection is specified in the purchase order, it shall be as specified in IS 6157 : 1981. If this inspection is not specified, the valve shall meet the requirements for visual examination described in IS 6157 : 1981.

12.2 The test pressure shall be as shown in Table 5.

13 MARKING

13.1 The valves shall be marked as specified in IS 9866 : 1981.

13.2 A line indicating the position of the body dividing wall shall be cast or embossed on the body of each valve.

14 COATING

14.1 Unmachined exterior surfaces of the shell shall be painted with heat resistant aluminium paint except austenitic steel valves which shall not be painted. Valves which have already been given a coat of parketizing or phosphatizing need not be given coating.

14.2 Machined or threaded surfaces shall be coated with an easily removable rust preventive. The stem is not required to be coated if the stem packing contains a sacrificial metal corrosion inhibitor.

15 SHIPMENT

15.1 The valves shall be dried and cleaned throughly after testing.

15.2 The valves shall be shipped in closed position, glands fully packed and all openings properly closed. End flanges and/or welding ends shall be blanked over their entire surface with bolted or steel strapped wood, fibre plastic or metal or other suitable covers (not smaller than the raised face diameter of the flange) and properly secured against opening. The end protector can also be securely attached to the valve end by suitable friction lending devices. Covers shall be of such a design that the valve cannot be installed without the removal of the protector cover. Any tapping shall be protected with thread protectors.

15.3 All machined and threaded parts shall be suitably protected with an approved rust preventive.

15.4 Valves shall be shipped with handwheel removed to protect against damage during transit. The handwheels shall be packed in a separate box if the number of valves is 10 or more. For less than 10 valves, the handwheels may be attached to the valves by wires or other suitable means.

15.5 The valves shall be shipped in wooden crates individually or collectively in a manner to prevent shifting within the package.

15.6 Shipping of loose valves is not recommended and if done, it will be at the risk of the manufacturer who will replace the same if any valves are damaged during transit.

Table 5 Hydrostatic Test Pressure to Nearest 1 Bar (G)

(*Clause* 12.2)

Material	Test Pressure, Bars (G) (Maximum Non-Shock Pressure)													
Designated by	Class 150		Class 300		Class 400		Class 600		Class 900		Class 1 500		Class 2 500	
Symbol	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat	Shell	Seat
Carbon steel/Carbon steel (low temp)	30	22	77	56	100	74	154	112	230	169	383	281	639	468
3½ percent Ni steel	24	17	61	45	87	63	122	89	183	134	304	223	507	371
½ Mo steel (low temp)	25	18	64	47	87	63	128	94	192	140	320	234	532	390
1 Cr ½ Mo steel	30	22	78	57	100	74	156	114	233	171	388	284	647	474
2½ Cr 1 Mo steel	30	22	78	57	100	74	156	114	233	171	388	284	647	474
5 Cr ½ Mo steel	30	22	78	57	100	74	156	114	233	171	388	284	647	474
18 Cr-8Ni	25	18	64	47	87	63	128	94	192	140	320	234	532	390
18 Cr-10Ni 2Mo	25	18	64	47	100	74	128	94	192	140	320	234	532	390
18 Cr-Ni-Ti	25	18	64	47	100	74	128	94	192	140	320	234	532	390
18 Cr-8Ni-Nb	25	18	64	47	100	74	128	94	192	140	320	234	532	390

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
554 : 1985	Dimensions for pipe threads where pressure-tight joints are made on threads (*third revision*)
1364	Hexagon head bolts, screws and nuts of product grades A and B
1364 (Part 1) : 1965	Hexagon head bolts (size range M3 to M36) (*second revision*)
1364 (Part 5) : 1985	Hexagon thin nuts (unchamfered) (size range M1·6 to M10) (*second revision*)
1570	Schedules for wrought steels
(Part 2) : 1979	Carbon steels (unalloyed steels) (*first revision*)
(Part 5) : 1985	Stainless and heat-resisting steels (*second revision*)
2004 : 1978	Carbon steels forgings for general engineering purposes (*second revision*)
2108 : 1977	Blackheart malleable iron castings (*first revision*)
2611 : 1964	Carbon chromium molybdenum steel forgings for high temperature service
2825 : 1969	Code for unfired pressure vessels
2856 : 1987	Carbon steel castings for pressure containing parts suitable for high temperature service (fusion welding quality) (*third revision*)
3038 : 1983	Alloy steel casting for pressure containing parts suitable for high temperature service (*second revision*)
3138 : 1966	Hexagonal bolts and nuts (M42 to M150)
3444 : 1987	Corrosion resistant high alloy steel and nickel based castings for general applications (*second revision*)
4131 : 1967	Nickel-copper alloy castings
4218	ISO metric screw threads (in different parts)
4899 : 1976	Ferritic steel castings for use at low temperature (*first revision*)
6157 : 1981	Valve inspection and test (*first revision*)
6603 : 1972	Stainless steel bars and flats
7008 : 1973	ISO metric trapezoidal screw threads (in different parts)
7806 : 1985	Martensitic and austenitic high alloy steel castings for high-temperature service (*first revision*)
9520 : 1980	Nominal sizes for valves
9625 : 1980	Locations of by-pass and drain connections for valves
9866 : 1981	Marking system for valves
9884 : 1981	Dimensions for ferrous valves-face-to-face and end-to-end
11790 : 1986	Specification for butt welding ends for pipes, valves flanges and fittings

ANNEX B

(Note 2 under Table 4)

COMPARATIVE STUDY OF STANDARDS

	Material Type	Specification		
		ASTM	BS	IS
CASTING	Carbon steel	A-216 Gr WC B	1504-161 Gr B	2856 : 1987 Gr 2
	Carbon steel (low temperature)	A-352 Gr LCB		1570 (Part 2) : 1979 25 C 8
	½ Mo steel (low temperature)	A-352 Gr LCI		4899 : 1976 Gr 4
	1 Cr½ Mo steel	A-217 Gr SC 6	1504-620	3038 : 1983 Gr 4
	2¼ Cr 1 Mo steel	A-217 Gr WC 9	1504-622	3038 : 1983 Gr 5
	5 Cr½ Mo steel	A-217 Gr C 5	1504-625	3038 : 1983 Gr 6
	18 Cr-8 Ni (AISI 304)	A-351 Gr CF 8	1504-304 S 40 (1504-885)	7806 : 1985 Gr 3
	18 Cr 10 Ni-2 Mo (AISI 316)	A-351 Gr CF 8	1504-316 S 40 (1504-885)	7806 : 1985 Gr 3
	18 Cr-8 Ni-NB (AISI 347)	A-351 Gr CF 8 C	1504-347 S 40 (1504-821 Gr NB)	7806 : 1985 Gr 5A
	Carpenter alloy	A-296 Gr CN 7 M		3444 : 1987 Gr 15
	3½ percent Ni steel	A-352 Gr LC 3	1504-503/1510-LT 100	4899 : 1976 Gr 3
FORGING	Carbon steel	A-105/A-181 Gr G 1	1503-161 Gr C	2004 : 1978 Gr 3 1875 : 1978
	Carbon steel (low temperature)	A-350 LF 2		1570 (Part 2) : 1979 15 C 8
	1 Cr½ Mo steel	A-182 Gr F 12	1503-620	2611 : 1964 15 Cr 70 Mo 55
	2¼ Cr 1 Mo steel	A-182 Gr F 22	1503-622	1570 (Part 5) : 1985 10 Cr 2 Mo 1
	5 Cr½ Mo steel	A-182 F 5 A	1503-625	1570 (Part 5) : 1985 20 Cr 5 Mo 55
	3½ percent Ni steel	A-350 Gr LF 3	1503-503/1510-LT 100	1570 (Part 5) : 1985 15 Ni 14 Cr 3 Mo 2
	18 Cr-8 Ni (AISI 304)	A-182 Gr F 304	1504-304 S 48 (1504-801)	1570 (Part 5) : 1985 04 Cr18 Ni 10
	18 Cr-10 Ni-2 Mo	A-182 Gr F 316	1504-316 S 40 (1504-845)	1570 (Part 5) : 1985 04 Cr 17 Ni 12 Mo 2
	18 Cr-8 Ni-Nb	A-182 Gr F 347	1504-347 S 40 (1504-821 Gr Nb)	1570 (Part 5) : 1985 04 Cr 18 Ni 10 Nb 40
	18 Cr-8 Ni-TI	A-182 Gr F 321	1504-321 S 40 (1504-821 Gr Ti)	1570 (Part 5) : 1985 04 Cr 18 Ni 10 Ti 20

NOTE — Material used shall be subjected to heat treatment procedure required by the corresponding material specifications.

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